

Centre for Human Palaeoecology, University of York

Research Forum 1999

*Abstracts from a one-day forum
held at the Tempest Anderson Hall, York
on 17th November 1999*

Department of Archaeology
University of York
Kings Manor
York YO1 7EQ

Environmental Archaeology Unit
Department of Biology
University of York
PO Box 373
York YO10 5YW, UK

Centre for Human Palaeoecology

*A joint research endeavour of the
Departments of Archaeology
and Biology*

Research Forum 1999

Organisers: Harry Kenward and Terry O'Connor

*Abstracts from a one-day forum
held at the Tempest Anderson Hall, York
on 17th November 1999*

Compiled by Harry Kenward

Programme

- 10.30 onwards: *Assemble* (coffee).
- 10.45 **Chair:** *Welcome and introduction.*
- 11.00-11.20 **James Barrett** (Department of Archaeology, University of York): *Palaeoeconomy of Norse Orkney: preliminary results of the Viking-Age Transitions Projects*
- 11.20-11.40 **Charles Frederick**, Cordova, C. E., McClung de Tapia, E., Winsborough, B., and Hodge, M. (Department of Archaeology and Prehistory, University of Sheffield): *Multi-disciplinary study of an Early Aztec Chinampa in the Southeast Basin of Mexico*
- 11.40-11.50 **Allan Hall** and Harry Kenward (EAU, University of York): *Hide and seek: plant and insect macrofossil evidence for medieval and post-medieval tanning*
- 11.50-12.10 **Phil Piper** (Department of Archaeology, University of York): *Small vertebrate ecology, taphonomy, and environmental reconstruction*
- 12.10-12.30 **Lucy M. E. McCobb** (Department of Earth Sciences, University of Bristol): *Dishing the dirt on our ancestors: fossilisation in ancient cess pits*
- 12.30-12.40 **Harry Kenward** (EAU, University of York): *A private affair: Roman and medieval lice from Carlisle.*
- 12.40-13.00 **Sonia O'Connor** (Department of Archaeological Sciences, University of Bradford): *Do we need brains?*
- 13.00-14.20 *Lunch*
- 14.20-14.40 **Keith Dobney**, Deborah Jaques and Cluny Johnstone (EAU, University of York): *Pigs, porpoises and power! Some results from current research on the vertebrate assemblage from Flixborough*
- 14.40-15.00 **Steve Rowlands** (Department of Archaeology, University of York): *Economy, society and supply of Dolforwyn Castle: a mid-term report on the animal bones*
- 15.00-15.10 **Allan Hall** and Harry Kenward (EAU, University of York): *On some notable peat deposits at St Paul's Green, York*
- 15.10-15.30 **Harry Kenward** (EAU, University of York): *Insects as indicators of land-use zonation in Roman Carlisle.*
- 15.30-15.50 *Tea*
- 15.50-16.10 **Jessica Davies** (Department of Archaeological Sciences, University of Bradford): *Arthropathies and animal husbandry*
- 16.10-16.30 **Raimonda Usai** (EAU, University of York): *Can we rely on micromorphological markers of past cultivation? Stanwix, a site near Hadrian's Wall*
- 16.30-16.50 **Susan Haynes**, A. Bretman, I. Barnes, J. P. W. Young, J. B. Searle and K. M. Dobney (Department of Biology, University of York): *Getting Answers from ancient DNA*
- 16.50 *General questions, discussion and closing remarks*

17.00

CLOSE

1. The palaeoeconomy of Norse Orkney: preliminary results of the Viking Age Transitions Project

James Barrett (Department of Archaeology, University of York)

The Viking Age Transitions project, begun in 1997, is an interdisciplinary study of the late first and early second millennia AD in northern Scotland. It focuses on socio-economic transformations from:

- moderate to high levels of surplus production
- Pictish to Norse culture
- non-market to market exchange
- rural to urban settlement
- decentralised to centralised authority
- pagan to Christian ideology

This paper will address the first three of these issues, considering results from zooarchaeological synthesis, stable isotopic analysis and recent excavations at Quoygrew, Orkney.

Intensification of production is recognisable in both terrestrial and maritime spheres of activity. The clearest evidence relates to the use of marine resources, particularly fish. More fishing occurred after the 8th or 9th century, with a particular emphasis on large gadids. This pattern is recognisable in both zooarchaeological and stable isotopic data. Although subject to ongoing debate, it could be interpreted as part of a maritime-oriented world view introduced by Scandinavian migrants.

The end of the Viking Age and transition to the Middle Ages was marked by yet another increase in the intensity of fishing. The absolute number of fish bones increased in medieval middens, as did the ratio of fish to mammal bone. Zooarchaeological evidence shows that some of the fish were butchered in a way consistent with stockfish or klipfisk (dried fish) production. At the same time, there is no clear isotopic evidence that the proportion of fish in the diet increased. It is thus possible that some of the resulting dried products were destined for export. These patterns may thus indicate the development of market trade in commodities a century or two before its appearance in the earliest reliable historical records regarding the economy of Scandinavian Scotland.

An indication of intensification in the terrestrial economy derives from the creation of anthropogenic plaggen soils. They began to form in northern Scotland in the Iron Age or earlier, but the most extensive expression of this process can be tentatively dated to the Viking Age - Medieval transition. The cereals produced on these soils were being exported from Orkney by c.1200 at the latest. The best evidence for intensification of the pastoral economy (specifically dairying) remains Julie Bond's work on the important Viking Age assemblage from Pool, Orkney. However, there is no clear evidence for trade of butter or wool until well into the Middle Ages.

2. Multi-disciplinary study of an Early Aztec Chinampa in the Southeast Basin of Mexico

Frederick, C. D., Cordova, C. E., McClung de Tapia, E., Winsborough, B., and Hodge, M. (Department of Archaeology and Prehistory, University of Sheffield)

Chinampas or wetland ridged fields are a highly productive form of pre-Columbian intensive agriculture. It is widely believed that the advent and large scale implementation of this agricultural strategy provided the dietary surplus that fuelled the demographic expansion coincident with the emergence of the Aztec Empire. Although there are numerous studies of extant chinampa agriculture, detailed examination of prehistoric fields are virtually unknown. This presentation summarises the results of a multi-disciplinary study of a deeply buried chinampa in the south-eastern Basin of Mexico (Rancho Mondragon, Ayotzingo) which provides new insights on chinampa agriculture.

A wide range of techniques were used to examine the construction, use and local environment associated with these fields. Analytical methods employed include the analysis of diatoms, macrobotanical remains, soils, ceramic inclusion, in addition to radiocarbon dating.

Together these data provide a detailed image of a single field created in the Early Postclassic, probably abandoned during the floods of the early Colonial period, and subsequently buried 2.5 m by an eighteenth century advance of the Amecameca River delta. The research highlights the potential and the pitfalls of working with anthropogenic sediments in the Basin of Mexico.

3. Hide and seek: plant and insect macrofossil evidence for medieval and post-medieval tanning

Allan Hall and Harry Kenward (EAU, University of York)

No one doubts the importance of the leather industry to many medieval and post-medieval towns. But, apart from remains of tanned leather itself, as offcuts or finished artefacts, tangible evidence from archaeological deposits for any of the many processes involved in transforming the hide of a dead herbivore into a finished leather object is (perhaps surprisingly) rare. Collections of sheep or cattle metapodials have sometimes been interpreted as waste from hides, discarded after tanning, while quantities of bark in urban occupation deposits are sometimes regarded as indicators of the possibility of tanning, if not its actual execution.

In this contribution, we will present some evidence from some medieval sites in York and post-medieval sites in Derry, N. Ireland and Chartres, France, which we feel sheds light on the question of identifying residues left by the tanning process via macrofossil remains. These comprise plants—in the form of very decayed bark, but, perhaps more significantly, concentrations of sclereids originating in bark—and some insects thought likely to have been associated with hides during storage prior to tanning.

4. Small vertebrate ecology, taphonomy, and environmental reconstruction

Phil Piper (Department of Archaeology, University of York)

The aim of this project is to improve the detail and quality of the interpretations that we make of small vertebrate remains (other than fish) from archaeological deposits on occupation sites. Small-vertebrate assemblages have been used as a source of information on the environment and ecology of the site, generally with the assumption that taxa such as mice and shrews have entered the deposits as a result of processes such as pit-fall trapping. The project will investigate the population and community ecology of the taxa most frequently encountered in such assemblages to model the biotic factors that might predispose certain taxa to be more or less likely to enter the archaeological record. Apart from species' requirements for food and shelter, inter-species competition and subtle forms of character displacement require this analysis to look at groups of taxa and their potential interaction. Examination of archaeological material will then be used to gain information on depositional processes, recording and interpreting the surface condition of individual bones, including unidentified material, in more detail than is usually the case. By putting the record of surface modifications together with the behavioural information for the species concerned, and with the contextual record for the deposit, the investigation will give a detailed and well-supported model of how that taxon association came together, how the bones entered that deposit, and therefore what information might be validly inferred about the site and its surroundings.

The reliability of an indicator group of such remains for identifying tanning processes will also be considered.

5. Dishing the dirt on our ancestors: fossilisation in ancient cess pits

Lucy M. E. McCobb (*Department of Earth Sciences, University of Bristol*)

Cess pits are a valuable source of biological remains dating from the medieval period to the present day. Their dual function as dustbins and latrines led to the accumulation of seeds, arthropod cuticles, wood and bone fragments which are often not preserved elsewhere. These fossils reveal information about diet and sanitary practices and, by implication, about agricultural practice, trade, social status and the general health of ancient peoples.

Fossils from cess pits are also a valuable (and until now, untapped) source of information about fossilisation processes in terrestrial environments. They reveal the early effects of the diagenetic processes which ultimately shape the ancient terrestrial fossil record. Biological remains from a number of ancient cess pits in and around York has been investigated. The pits range from the fourth to the sixteenth centuries AD and include a tenth century pit from Anglo-Scandinavian Coppergate. The fossils recovered include bone fragments, and mineralised and unmineralised arthropod remains and seeds; not all preservational categories are represented in each pit.

Mineralised fossils are often preserved within faecal concretions. Generally only soft-bodied animals and other readily decayed structures, such as fly pupae and seed embryos, are preserved in this way. They are replaced by calcium phosphate (analysed using EDX) and show a high level of structural preservation under SEM, retaining cell walls in the endosperm and cotyledon tissues of seeds, and muscle tissue and setae in fly pupae. The closed conditions required for phosphatisation may have been created by daily addition of organic matter to the cess pits or, on a highly localised scale, within seed coats. High concentrations of iron and manganese detected (by ICP-AES) in phosphatised apple seeds from Coppergate suggest that iron-reduction and manganese-reduction were important microbial metabolic pathways involved in their decay.

Non-mineralised organic remains are represented principally by seed coats and arthropod cuticles, which show a high level of morphological preservation under SEM. Seed coats and beetle elytra show only minor degradation of cellulose and protein, respectively, as revealed by Py-GC/MS (flash pyrolysis-gas chromatography/mass spectrometry).

On-going study of ancient cess pits and other archaeological deposits will further define the processes and conditions associated with different preservational styles. This will enhance the environmental information which can be obtained from archaeological fossils and highlight preservational biases associated with different deposit types.

6. A private affair: Roman and medieval pubic lice from Carlisle

Harry Kenward (EAU, University of York)

Human head and/or body lice (*Pediculus humanus*) and human fleas (*Pulex irritans*) are very common in archaeological occupation deposits where conditions are conducive to their preservation. By contrast, the pubic or crab louse, *Phthirus pubis* (L.), has only twice been found in archaeological deposits: a single fossil from eighteenth century London (Girling 1984), and a group of three from post-medieval deposits, probably of the 17th century, in Iceland (Buckland *et al.* 1992). This pattern of occurrence might give rise to the suspicion that the insect was a late introduction. However, new records from pit fills revealed during excavations of urban occupation layers at the Keay's Lane C site in Carlisle, Cumbria, have now shown that the pubic louse was present in Britain in the Roman and medieval periods.

The Roman louse, dated between the late first and mid-second centuries AD was partly mineralised and detail was obscured, but it could be positively identified by its general body form and such structure as could be discerned. The medieval louse was excellently preserved by anoxic waterlogging.

It is argued that the crab louse may inevitably be poorly represented in the fossil record, limiting the likelihood of obtaining a clear picture of its origin and spread.

These specimens from Carlisle push back the confirmed presence of the pubic louse in Europe by almost 15 centuries and add to the evidence for a long association with *Homo sapiens*.

7. Do we need brains?

Sonia O'Connor (*Department of Archaeological Sciences, University of Bradford*)

In 1994 the excavation of the Augustinian Friary at the Magistrates' Court site in the medieval heart of Hull produced the remains of approximately 250 human skeletons. Upon examination, 10% of them appeared to have remains of brain tissue preserved within the skulls.

Finds of preserved brains from human burials in wet ground have occurred elsewhere, but they have rarely been properly studied or published. This paper explores the issues relating to such finds and suggests that their survival may have implications for our understanding of the archaeology of the site.

8. Pigs, porpoises and power! Some results from current research on the vertebrate assemblage from Flixborough

Keith Dobney, Deborah Jaques and Cluny Johnstone (EAU, University of York)

Between 1989 and 1991, excavations at Flixborough, on the southern bank of the Humber estuary in north-eastern England, uncovered the remains of what is interpreted as having been an exceptionally wealthy Anglo-Saxon rural settlement. The remains of 39 buildings, 15,000 artefacts and approximately 170,000 hand-collected animal bones were recovered. (There was also bioarchaeological material recovered from sediment samples.) These remains were stratified in an unprecedented vertical stratigraphic sequence of 10 main occupation phases, dating from approximately AD600 to 1400, with the most intensive occupation during the middle Saxon and Anglo-Scandinavian periods (AD600-1000).

This paper presents some of the most recent evidence from ongoing post-excavation analysis of the vertebrate remains. It will illustrate that a series of major changes in the character of the settlement took place during the middle to late Saxon period and throw light on its relationships both with its immediate hinterland and with the wider world.

9. Economy, society and supply of Dolforwyn Castle: a mid-term report on the Animal Bones

Stephen Rowland (Department of Archaeology, University of York)

This contribution is based on work undertaken for an MSc dissertation finished in October 1999. Further work is expected to be completed by summer of 2000. Although only a relatively small amount of material has been studied so far (200 kg), it represents the bulk of the bone from the site (300 kg). As yet, only larger mammal and bird bones have been examined. This material has been used to suggest several hypotheses concerning the occupation and development of the castle and its hinterland, which it is hoped will be supported by the analysis of the rest of the assemblage.

Dolforwyn castle lies on a rocky outcrop overlooking the river Severn in the county of Powys, about 5 miles from Montgomery. Since 1981 the castle has been excavated as a training dig directed by Dr. Lawrence Butler. The site has much historical interest, being built by Llewelyn ap Gruffydd, the last independent Prince of Wales between 1273 and 1277. That such an installation should be built so close to the Welsh/English border, and in direct opposition to the English castle at Montgomery, was seen as an affront to the English. Along with ap Gruffydd's refusal to swear fealty to Edward I, this was one insult too many, and the castle was laid siege to by an English army under the leadership of the Marcher Lord Roger Mortimer. A combination of catapult bombardment and lack of water forced the defenders to capitulate, and Edward allowed Mortimer to add the castle to his already substantial collection of residences. The Mortimers were a colourful if unoriginal family, frequently involved in treasonable activities, but confusingly nearly always called Roger. In 1321 the castle and its land were stripped from one of these Roger Mortimers on account of treason, and was not returned to his son until 1331. Between then and 1398, when the castle was described as ruinous and worthless, the nature of occupation is uncertain, but it is possible that it provided accommodation for a constable and his staff. The castle remained unoccupied until a post-medieval shepherd's hut was built over the entrance, and was also an attraction to picnickers in the last couple of centuries. As such Dolforwyn offers a number of interesting opportunities. Not only is the Medieval occupation short, just over 100 years according to documentary sources, but the usage of the castle spans a period of transition from Welsh to English influences on both the occupation deposits, and also the surrounding area. Attempts were therefore made to determine distinctions between the Welsh and English occupations, which might be attributable to differential access to resources, or to cultural practices. The variation between English phases was also considered. Spatial analysis was attempted for the English phases, but there was little apparent pattern when the two areas, the north (High status) and south ranges, were compared.

The results demonstrated that if there were major cultural differences between the Welsh and English occupants, they were rarely apparent from the animal bones. However, there did appear to be a change in the nature of the material towards the end of the English occupation, which may suggest that the supply of the castle, and by inference the local economy, was changing from a more socially embedded mechanism to one that was more Anglicised and market-orientated. This may coincide with the widespread introduction of coinage into Wales, and its usage for everyday transactions and taxation.

10. On some notable peat deposits at St Paul's Green, York

Allan Hall and Harry Kenward (EAU, University of York)

During a watching brief by York Archaeological Trust, undertaken in the course of the laying of sewer pipes at a housing development just 300m west of York Railway Station (and not much more than a kilometre from the city centre), a layer of peat up to about 1.5m thick was encountered. It yielded a large neolithic limestone handaxe and some early Bronze Age pottery, artefacts which are extremely rare in the area, and was clearly rich in well-preserved plant and insect macrofossil remains. Indeed, much of the peat consisted of 'brown mosses' of the kind commonly recorded in post-glacial deposits formed in 'intermediate fen' environments. The mosses and beetles preserved within them often retained something of their original colours in freshly exposed surfaces.

The peat lay over unconsolidated sands, presumably fluvio-glacial outwash, and was overlain in turn by what appeared to be a dump of sandy deposits containing Roman pottery, perhaps representing an attempt to make boggy ground passable (a Roman road is known to run close to the site), and by later jumbled dumps, perhaps further make-up for land which was sinking.

Subsequent to the watching brief, a borehole survey was undertaken to define the lateral and vertical limits of the peat and this produced material which suggested that, in places at least, there might be evidence for changing water levels.

Though currently dated only informally via artefacts, with a proper dating framework the peat at St Paul's Green will be a valuable source of palaeoecological information in its own right. With the artefacts it evidently contains, it assumes rather more direct archaeological significance, as a unique deposit within the environs of York. An application for funds to undertake an excavation of part of the site, with a large-scale palaeoenvironmental study, is currently being considered by English Heritage.

11. Insects as indicators of land-use zonation in Roman Carlisle

Harry Kenward (EAU, University of York)

In an attempt to reconstruct patterns of land-use in Carlisle, Northern England, systematic differences between the Roman insect fauna of four sites, or groups of sites, have been sought using a range of methods. The sites were: Annetwell Street; Castle Street; sites designed 'Lanes 2' (Keay's Lane A-D and Law's Lane B-D); and a final group designated 'Lanes 1' (Old Grapes Lane A-B and Lewthwaite's Lane A).

The cumulative impression gained by inspection at the sample assemblage level suggested a trend from Annetwell Street, which appears to have been a relatively clean area within the fort; through Castle Street, just outside the fort and in an area believed to have largely been devoted to servicing it, with much foul matter from stabling; to Lanes 2, which appears to have been an intensively-used area; and then to Lanes 1, which seems to have seen substantially less intensive occupation, and perhaps had an almost rural character.

These impressions were supported in general terms by inspection and statistical analysis of derived statistics for ecological groups, both at the site level and for selected feature types.

Analysis of species associations at the sites gave results requiring subtle interpretation, but again tended to underpin the broad trends inferred from analysis of sample assemblages.

12. Joint Pathology in association with the use of animals for draught: an archaeozoological perspective

Jessica J. Davies (Department of Archaeological Sciences, University of Bradford)

This presentation summarises a recent study to determine what is currently known about the relationship between the use of animals for draught and the occurrence of joint pathologies in these animals.

Veterinary literature and studies of reference collections of modern draught animals are considered in an attempt to determine if it is possible to ascertain from archaeozoological remains whether or not animals were used for draught in the past, and with what degree of certainty.

The study was undertaken as part of research towards a MPhil into the utility of animal bone palaeopathology as a guide to past husbandry practices.

13. Can we rely on micromorphological markers of past cultivation? Stanwix, a site near Hadrian's Wall

M.-Raimonda Usai (Environmental Archaeology Unit, University of York)

During the last thirty years, sandy, silty and dusty textural pedofeatures have often been considered diagnostic of past and modern agricultural practices. This was probably due to the fact that such pedofeatures had been identified in comprehensive studies on modern cultivated Dutch soils, and that internationally accepted soil classifications produced by the United States Department of Agriculture (USDA) have described soil horizons under cultivated topsoils (*agric horizons*) as containing significant amounts of illuvial silt, sand, clay and humus.

Due to the intrinsic soil variability, however, there is a need for testing whether results obtained for selected Dutch soils can be extrapolated to all soils. There is also a need for establishing the applicability of observations concerning features of modern soils to ancient soils. To address the above issues, macro- and micromorphological analyses were carried out on more than thirty contexts containing pre-Roman plough marks near Hadrian's Wall, Cumbria. Results showed that the pedofeatures were mainly located in contexts which were unlikely to have been affected by cultivation, and were absent in materials from and below the contexts where past agriculture was documented by field and archaeological features. The pedofeatures tended to be distributed in parts of the sequence with suitable porosity, soil structure and texture rather than below cultivated horizons.

14. Getting *Answers* from ancient DNA

S. Haynes, A. Bretman, I. Barnes, J. P. W. Young, J. B. Searle and K. M. Dobney***
(*Department of Biology, University of York. *Biological Anthropology, University of Oxford. ** Environmental Archaeology Unit, University of York*)

Ancient DNA (aDNA) research has applications in a number of areas in modern biology including conservation genetics, phylogeography and evolution. It adds a new dimension to genetic studies by enabling us to sample the past directly, in a sense catching evolution red-handed.

Since the mid 1980s aDNA techniques have become increasingly common in the study of both archaeological and palaeontological material. Some of the initial studies in this area captured both scientific and public interest with claims of DNA from dinosaurs and insects in amber. However, much of this early work requires verification, and studies of geological aDNA remain, for the time being, in the realms of science fiction. The real potential for the recovery of genetic information from long-dead organisms is now being realised with the application of aDNA techniques to a range of archaeological material and questions.

Species identification is a common problem in zooarchaeological assemblages. Traditionally, interpretations were based on techniques using shape (morphology) and size (biometry). However, these approaches are not always successful. This is true for geese. Both wild and domestic geese are frequently recovered from archaeological assemblages but their identification to species level is complicated by a number of factors:

- (1) there is little morphological variation in post-cranial skeletal elements;
- (2) there is a large degree of biometric overlap between species and sexes;
- (3) the fragmentary nature of archaeological material often renders morphological and biometrical approaches problematic.

Previous studies at The University of York showed that DNA retrieval from goose remains at the site of Flixborough, North Lincolnshire was possible. This provides an accurate means of identifying bones to species level. This work is now being extended to a large number of bones from this site representing the Mid-Late Saxon periods. Accurate species identification will enable us, for the first time, to examine the past distribution (palaeobiogeography) and human exploitation of individual wild geese species at this site and how these changed over time. We have also identified a genetic marker for domestic forms. This enables us to look at the proportions of wild and domestic individuals present and hence obtain information about Saxon husbandry practices and wildfowling strategies. It will also provide unique information regarding the origins of the ancestors of domestic geese, an important issue in itself.

Associates of the Centre for Human Palaeoecology

Department of Archaeology

James Barrett
Don Brothwell
Terry O'Connor

Environmental Archaeology Unit

Fellows funded by English Heritage

Keith Dobney	vertebrates
Allan Hall	plant remains
Harry Kenward	Director; invertebrates, especially insects
Raimonda Usai	soils and sediments

Palaeoecology Research Services

John Carrott	microfossils, particularly parasite eggs; molluscs; computing
Deborah Jaques	vertebrates
Cluny Johnstone	vertebrates
Frances Large	insects

The EAU's Line Manager in the Department of Biology is Professor Peter Young.

Research students

Mark Beech
Susan Haynes
Phil Piper

About the EAU

The Environmental Archaeology Unit is a research group within the Department of Biology at the University of York. It was established in 1975 with funding from the Historic Buildings and Monuments Commission (Department of the Environment) and the Leverhulme Trust. Currently four Research Fellows are funded by the Ancient Monuments Laboratory of English Heritage, and a variable number of other staff (typically four or five) are supported from commercial contracts and English Heritage project funding. Contacts with other institutions include many archaeological units and university departments.

The Unit strives towards an integrated approach to environmental archaeology, drawing together information from many aspects of the subject, including studies of soils and sediments, pollen, plant macrofossil remains of all kinds, invertebrates (including parasitic nematodes, insects and other arthropods, and molluscs), and vertebrates. We believe that the integration of evidence is crucial in building a more solid foundation for the interpretation of the evidence as a whole from archaeological deposits, leading to the recovery of much more valuable information than work on single specialisms or isolated parallel studies.

The EAU contract group, *Palaeoecology Research Services* (PRS), is able to organise and execute environmental archaeology studies of most kinds, including evaluations, drawing on a wide range of expertise. More information can be obtained from the staff of PRS ('phone 01904 434475 and 434487, fax 433850).

The Departments of Archaeology and Biology at the University of York in 1995 formed the interdisciplinary *Centre for Palaeoecology*, an umbrella for the activities of the EAU and other researchers in the broad areas of palaeoecology and environmental archaeology.

A list of publications and reports by EAU staff and associates is available free on application to the Director, and is also accessible through the internet.

The Unit's web page can be found at <http://www.york.ac.uk/inst/eau/>.